

NONVOLATILE SEMICONDUCTOR MEMORY DEVICE AND METHOD FOR  
OPERATING THE SAME

ABSTRACT OF THE DISCLOSURE

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A nonvolatile semiconductor memory device comprised of MONOS type memory cells of increased efficiency of hot electron injection in a write operation as well as improved scaling characteristics is disclosed. The memory transistor comprises a channel forming region in the vicinity of the surface of the substrate, a first and a second impurity regions formed in the vicinity of the surface of the substrate sandwiching the channel forming region between them, acting as a source and a drain in operation, a gate insulating film stacked on the channel forming region and comprised of a plurality of films, a gate electrode provided on the gate insulating film, a charge storing means which is formed in the gate insulating film dispersed in the plane facing the channel forming region and in the direction of thickness and is injected with excited hot electrons in operation due to the electric fields applied. The bottom insulating film constituting and at the bottom of the gate insulating film includes a dielectric film that exhibits a FN type electroconductivity and makes the energy barrier between

the bottom insulating film and the substrate lower than that between silicon dioxide and silicon.